

Claims:

1. An AC coupling module for coupling a powerline node to a medium voltage power line, the AC coupling module comprising:

a housing having a housing upper portion and a housing lower portion;

5 an insulator extending through the housing upper portion;

a transformer contained in the housing upper portion having a high side connection, a low side connection, and windings, the high side for coupling to the medium voltage power line via the insulator;

10 a capacitor contained within the housing upper portion, the capacitor having a first side coupled to the high side connection and a second side;

a signal link coupled to the second side of the capacitor and passing between the housing upper portion and the housing lower portion to provide a signal connection point in the housing lower portion; and

15 a power link coupled to the transformer low side and passing between the housing upper portion and the housing lower portion to provide a power connection point in the housing lower portion.

2. The AC coupling module of claim 1, further comprising a powerline node assembly that is received within the housing lower portion.

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3. The AC coupling module of claim 2, wherein the powerline node assembly comprises:

an isolation transformer having a first side for coupling to the signal connection point and a second side;

25 powerline node electronics coupled to the second side of the isolation transformer and communicatively coupled to a servicing powerline termination module; and

powerline node power supply coupled to the power connection point that provides power to the powerline node electronics.

30 4. The AC coupling module of claim 1, wherein the housing is cylindrically shaped.

5. The AC coupling module of claim 1, further comprising insulating oil contained within the housing upper portion in which the transformer is bathed.

5 6. The AC coupling module of claim 1, further comprising a surge arrestor coupled between the insulator and an external portion of the housing upper portion.

7. An AC coupling module for coupling a powerline node to a medium voltage power line, the AC coupling module comprising:

10 a housing;

a transformer contained in the housing that has a high side connection for coupling to the medium voltage power line via an insulator extending through the housing and a low side connection;

15 a capacitor contained within the housing, the capacitor having a first side coupled to the high side connection of the transformer and a second side; and

a signal connection having a first side coupled to the second side of the capacitor, a central portion insulated from and extending through the housing, and a signal connection point external to the housing.

8. The AC coupling module of claim 7, wherein the housing is cylindrically shaped.

20 9. The AC coupling module of claim 7, further comprising insulating oil contained within the housing in which the transformer is bathed.

10. An AC coupling module for coupling a powerline node to a medium voltage power line via a test point of an dead front transformer, the AC coupling module comprising:

- a housing;
- an insulator extending through the housing;
- a coupling capacitor having a first side for coupling to the test point of the dead front transformer via a conductor passing through the insulator and having a second side;
- an isolation transformer having a first side coupled to the second side of the coupling capacitor and a second side for coupling to the powerline node; and
- a surge arrestor coupled across the first side of the isolation transformer.

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11. The AC coupling module of claim 10, further comprising a powerline node assembly that is received within the housing.

12. The AC coupling module of claim 11, wherein the powerline node assembly
10 comprises:

powerline node electronics communicatively coupled to the second side of the isolation transformer and communicatively coupled to a servicing powerline termination module; and

15 powerline node power supply coupled to the second side of the isolation transformer that provides power to the powerline node electronics.

13. An AC coupling module for coupling a powerline node to a medium voltage power line, the AC coupling module comprising:

a surge arrestor having a high side for coupling to the medium voltage power line and a ground side and a ground side;

a coupling capacitor having a first side coupled to the ground side of the surge arrestor and a second side; and

an isolation transformer coupled on a first side to the second side of the coupling capacitor and having a second side for coupling to the powerline node.

14. The AC coupling module of claim 13, further comprising:

powerline node electronics communicatively coupled to the second side of the isolation transformer and communicatively coupled to a servicing powerline termination module; and

powerline node power supply coupled to a power supply input that provides power to the powerline node electronics.

15. An AC coupling module for coupling a powerline node to a medium voltage power line, the AC coupling module comprising:

a dielectric core that couples directly to the medium voltage power line such that the medium voltage power line passes through the dielectric core;

a winding disposed about the dielectric core;

a signal coupling winding communicatively coupled to the winding; and

a coupling capacitor coupled to the signal coupling winding.

16. The AC coupling module of claim 15, further comprising a powerline node assembly that couples to the AC coupling module via the coupling capacitor.

17. The AC coupling module of claim 16, wherein the powerline node assembly comprises:

powerline node electronics communicatively coupled to the signal coupling winding and to the coupling capacitor; and

powerline node power supply that provides power to the powerline node electronics.